A Report on Indoor Pollution Research and its Potential and Actual Applications in Architectural Practice

Hal Levin, Research Specialist
Center for Environmental Design Research
University of California, Berkeley

ABSTRACT

This paper reports on current trends in indoor pollution research and its emerging applications in architectural practice. It also describes various stages in project development which can be enhanced by an ecological approach called "Building Ecology."

Indoor pollution researchers are currently developing improved methods of characterizing indoor air quality and its relationship to ventilation. They are concerned with the sources, typical airborne concentrations and the health effects of several specific pollutants such as radon, formaldehyde, organic compounds, and the less stable components of adhesives. Increasing attention is now given to the control of biological contaminants indoors as potential causes of "building sickness." Methods for controlling air quality at minimal energy consumption levels continue to receive substantial research interest. Additionally, the impact of environmental lighting on human health and well-being as well as long-standing interest in the effects of noise are topics of current investigations.

Knowledge gained from research is being integrated in architectural practice within the framework of traditional architectural tasks. An illustrative example is the specification of building materials and furnishings which are more stable and contain minimal levels of toxic or irritating components. Some buildings are being tested for air quality and ventilation system performance prior to occupancy. We have begun to see the more complete integration of environmental and ecological concerns in each major phase of architectural practice. Examples include site selection criteria and procedures to reduce off-site sources of pollution; site planning and design development to minimize harmful impacts of surrounding environmental sources of pollution; building conceptual design emphasizing environmental control strategies for factors including thermal, lighting, acoustic, ventilation, air quality, humidity, odors; ventilation strategies to control contaminant levels indoors; and others. An ecological approach can be extended throughout the architect's work in preliminary design, design development, construction documents preparation, bidding, construction observation, closing out a job, and launching a new building. There are also special tasks which might be performed for remodelling, adaptive re-use and restoration projects.

Mr. Levin has been researching indoor pollution since 1978 and has been a consultant to the Office of the State Architect in California as well as major federal government and private clients.

NOTES FOR TALK AT R&D 85 March 10, 1985

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Summary

This paper reports current trends in indoor pollution research and its emerging applications in architectural practice. Various stages in project design and development which can be enhanced by an ecological approach are discussed. The paper then describes some architectural tasks and services to control or eliminate indoor pollution. The description of services presents a general introduction to the detailed services which are or can be provided by architects.

[Following is a revision of the abstract to serve as an outline for t
talk. the idea is to work the paper and other material into the outl
developed by the abstract.]

[NOTE: insert an intro here stating purpose, scope, format and conclu
presentation.]

Introduction

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as well as other substances frequently found in indoor air.

Increasing attention is now given to the control of
BIOLOGICAL CONTAMINANTS
indoors as potential causes of

BUILDING SICKNESS "building sickness."

Methods for
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minimal energy consumption levels
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Additionally,
the impact of environmental lighting on human health and well-being
as well as
long-standing interest in the effects of noise
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Knowledge gained from research is being integrated in architectural
practice within the framework of traditional architectural tasks. An
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Some buildings are being tested for air quality and
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We have begun to see the
more complete integration of environmental and ecological concerns in each
major phase of architectural practice.

Examples include

site selection criteria and
procedures to reduce off-site sources of pollution;

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environmental control strategies for factors including
thermal,
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An ecological approach
can be extended throughout the architect's work in preliminary design,
design development, construction documents preparation, bidding,
construction observation, closing out a job, and launching a new building.

There are also special tasks which might be performed for remodelling,
adaptive re-use and restoration projects.

Conclusion: Building ecology -
- Definition
- prinicples of ecology
- Application in architecture
- Potential to improve quality of environments

ADDITIONAL THOUGHTS TO ADD TO TALK

. To date the field has been dominated by chemists, physicists, public ealth epidemiologists, health scientists,

. What is seriousness of problem? How does it compare with other azards, risks, causes of death, morbidity, etc.?

. Who does it affect?

. The effective application of indoor pollution research into nvironmental design (or architectural practice) requires understanding the elationships of various forms of environmental stress on the building ccupant.

. User control

OTES FROM TAPED NOTES

ir pollution versus other pollutants

rief summary of stress model

xamples of work done in other fields
lighting
noise
color
energy efficiency in byuildings

ir pollution: a traditional architecturla concern, not a new one

ttention from energy conservation

haracterization
sampling
distinguishing building ;types

entilation characterization
jprogress in HVAC equipmenet, design, technology, colntrol, digital ata acquisioition and controls

rchitectural decisions at conceptual level are the most important
later decisions may be impoertant b;ut will not nahave the impacts that he conpecptiual levles

xposure studies
nitrous ocsxides,
carbon dioxicde
carbon monoxide
suflfur dioxicde
radon
organics
particulartes

asbestos

history
large amounts of money now being spent on abatement
lack of coordination with other iaq researchers
large amount of work on abatement
schools
offices and other public buildings

egulatory-induced abatement activitiies
asbestos is not the only one
radon work done for miners provides standard, monitoring equipment
formaldehyde: competitors, manufacturers of diverse products trying to limit liability, source strengths, controls
tobacco smoke: anti smoking ordinances in 39 communities in California, and the number is growing constantly
pentachlorophenol: and other wood preservatives, inderictly due to vareness of the toxicity of its common impurities which are ingredients of gent orange and are formed as b;y products of PCB combustion

ealth effects
efforts to understand
legionaires disease
other biological aerosols
building sickness
long term: genetic toxicity, carcinogenicity
(raises moral issues, responsibility of arhcitect)

ational strategy

RCHITECTURAL IMPACTS AND APPLICATIONS IN PRACTICE SITUATIONS
npacts on architectural projects
site selection, design
concepts
schematics
preliminaries
specifactions -= product research
materials testing

avoidance of problems versus design of healthy environments, superior ork or living environments will become more important as ability to nderstand effects evolves. possible competition amongst architects for .ients seeking healthy buildings for competitive advantage for recruitment oductivity, economic advantages of improved environments

allenge to create healthy buildings at a low first cost

ser control: of environmental control systems, lighting, thermal, ntilation, air movement, noise, shading,

uilding ecology: integration of dynamic, interactive model of enviornmental ctors into the design of buildings.